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Test and Evaluation

**OO-ALC TEST AND EVALUATION (T&E)
RISK MANAGEMENT PROCESS**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFMCI 99-103, *Test and Evaluation (T&E) Test Management*, and further delineates AFI 99-103, *Capabilities Based Test and Evaluation*, and AFMC sup 1 to AFI 91-202, *The USAF Mishap Prevention Program*, and provides guidance and procedures for all T&E conducted by or for Ogden Air Logistics Center (OO-ALC), or that puts OO-ALC assets (material and personnel) at risk. It provides for risk reduction and establishes a disciplined test management process. See **Attachment 1** for Glossary of References and Supporting Information. Maintain and dispose of records in accordance with AFMAN 37-123, *Management of Records*, and the AFRIMS Records Disposition Schedule (RDS).

SUMMARY OF REVISIONS

This document is new and must be completely reviewed. This instruction reflects changes in higher-level T&E documents addressing the integration of both developmental and operational T&E; early tester involvement in planning for acquisition and sustainment programs; formation of integrated test teams (ITT); changes in the roles and responsibilities for the OO-ALC Center Test Authority and Test Representative; and outlines local procedures for designating a test organization.

This document also incorporates changes resulting from the establishment of a Wing structure at OO-ALC, as well as Program Executive Officer (PEO) realignment.

1. Applicability.

1.1. The test process outlined in this instruction applies to all tests (as defined in the glossary) conducted by OO-ALC organizations, conducted as a requirement of OO-ALC organizations, or that may pose a safety or environmental risk to OO-ALC assets, both material and personnel (other than normal airfield operations).

1.2. All OO-ALC organizations shall use this process. Non-OO-ALC test organizations may use their own, equivalent technical and safety review procedures if that test organization has been approved by

the Test and Evaluation Strategy (TES) approval authority. This approval must be based in part on OO-ALC personnel participation in that process. This includes tests conducted by another service, major Air Force command (MAJCOM), the Air Force Reserve or Air National Guard, tenant units, and contractors.

1.3. For any activity not specified above, the application of this instruction shall be at the discretion of the Center Test Authority (CTA). All aircraft and associated munitions staging from Hill AFB are required to be identified IAW Hill AFB Instruction 10-401, *Support of Units Deployed to Hill AFB*.

1.4. Wing supplements to this instruction and other OO-ALC organization operating instructions and business practices pertaining to test shall be coordinated through the CTA.

2. Responsibilities. General responsibilities are listed in AFI 99-103 and AFMCI 99-103, and AFI 91-202_AFMC Supplement 1. Responsibilities specific to OO-ALC are as follows:

2.1. OO-ALC Commander (OO-ALC/CC). OO-ALC/CC will:

2.1.1. Establish the center's process for accomplishing T&E.

2.1.2. Establish a CTA organization to oversee, conduct, or otherwise accomplish the center's T&E requirements.

2.1.3. Be the approval authority for all high safety risk test plans.

2.1.4. Be the approval authority for memorandums of agreements (MOA) establishing Test Representative positions at OO-ALC.

2.1.5. As the sustainment commander, the OO-ALC Commander, like his PEO counterparts (IAW AFI 99-103), will approve or delegate approval authority of ITT charters, TESs, and milestone decisions for his respective portfolio of sustainment programs.

2.2. Center Test Authority (CTA). The OO-ALC CTA will:

2.2.1. Publish and implement the OO-ALC T&E process.

2.2.2. Advise the PEO and sustainment commander on T&E issues to include selection of a test organization and certification of readiness for operational testing.

2.2.3. Provide oversight for all OO-ALC T&E planning, provisioning, executing, and reporting.

2.2.4. Assist the OO-ALC Program Managers (PM) in development of the TES. Perform developmental test organization responsibilities in the pre-ITT until the test organization is approved.

2.2.5. Determine when a formal Technical Review Board (TRB) is required. Ensure appropriate independent technical expert participation in reviews and approvals for all testing. The CTA provides the TRB chairman.

2.2.6. Represent OO-ALC on T&E issues with HQ AFMC, USAF T&E Directorate (USAF/TE), MAJCOMs, and other external agencies.

2.2.7. Establish processes and maintain and manage requisite capabilities to conduct low risk, low cost, short duration developmental T&E, including qualification T&E and sustainment testing on OO-ALC managed systems.

2.3. Test Representative. The Test Representatives will:

2.3.1. Network between the AFMC Fielding and Test Division (AFMC/A3F), OO-ALC, and the Test Centers/Wing on issues related to test infrastructure and resource requirements.

2.3.2. Provide expert test advice and consultation to the CTA, OO-ALC test organizations, and PMs.

2.3.3. Ensure oversight requirements are met with the Test Center/Wing. This includes a preliminary assessment of technical and safety risk, and coordination on all OO-ALC test organization test plans and safety reviews.

2.3.4. Provide physical oversight and assistance, to include in-flight participation, when appropriate and authorized, at test execution locations.

2.4. Program Managers (PM). The PM will:

2.4.1. Ensure the program's compliance with this instruction.

2.4.2. Integrate the T&E process into the weapon system configuration control process.

2.4.3. Provide test funding and resources not available at the test organization.

2.4.4. Create a pre-ITT and ITT to determine what/if testing is required, to develop the TES and other ITT documents, and to manage the test program.

2.4.5. Maintain the deficiency reporting system.

2.5. OO-ALC Test Organization. When an OO-ALC test organization is selected to participate in the project, it will:

2.5.1. Participate in the ITT.

2.5.2. Develop the detailed test plan and safety appendix, test what-ifs, and run cards.

2.5.3. Develop support agreements with other organizations for required test support.

2.5.4. Conduct the technical, safety, and readiness review boards, and the test briefings/debriefings.

2.5.5. Accept safety responsibility for the test.

2.5.6. Control the conduct of the test IAW the test planning documents.

2.5.7. Track, analyze, and report test results and deficiencies.

2.5.8. Maintain a lessons learned database and apply lessons learned to all test planning.

2.6. OO-ALC Center Safety Directorate (OO-ALC/SE). OO-ALC/SE will:

2.6.1. Manage the OO-ALC test safety risk reduction process.

2.6.2. Determine when a formal Safety Review Board (SRB) is required. Ensure appropriate independent expert participation in reviews and approvals for all testing.

3. Test Development.

3.1. Integrated Test Team (ITT). AFI 99-103 makes an ITT mandatory for all programs. It is the primary mechanism to achieve collaboration and early tester involvement to infuse testability and operational realism into the program. The ITT ensures the appropriate testing is accomplished to meet the program risk reduction goals.

3.1.1. Pre-ITT. A pre-ITT is formed by the PM at the beginning of all projects (includes COTS, NDI, potential form-fit-function-interface changes, modifications, field service evaluations, shelf life evaluations, and manufacturing and repair source qualifications). The pre-ITT determines if and what testing is required. When test expert involvement is required, the CTA should participate. If testing requires support from Government and contractor test organizations, the pre-ITT develops an ITT charter and TES to define how the testing will be accomplished. These documents must be coordinated through the CTA and are approved by either the PEO or the sustainment commander, depending on who oversees the program. **NOTE:** AFI 99-103 has additional coordination requirements for programs requiring a Test and Evaluation Master Plan (TEMP).

3.1.1.1. ITT Charter. The ITT charter documents the membership, duties and responsibilities, and the method of conducting business. A standing ITT is acceptable for similar programs on a single weapons system. Sample charters are available from the Test Representative.

3.1.1.2. TES. The TES uses the same format as, and may be replaced by, the TEMP. The pre-ITT considers the requirements for all testing phases (source and component qualification, modeling & simulation, integration, hardware-in-the-loop, system-level, operational, and required certifications such as Live Fire and Seek Eagle). Required test assets and personnel are identified. The test facility and range are identified with priority given to Air Force facilities, followed by other DoD-owned facilities. Contractor facilities are only used when justified through a cost benefit analysis. The TES specifies and justifies the lead test organizations. An information copy of the approved TES will be sent to AFMC/A3F. The TES is a living document; it must be updated after the ITT is convened and at each program milestone.

3.1.1.3. Lead Test Organizations. Pre-ITT selection of the appropriate test organizations is essential to the success of the program and for management of test resources. Coordination with the OO-ALC Test Representative and AFOTEC/AS during this selection is mandatory. Developmental testing must be accomplished by an AFMC test organization when possible; avoidance of reimbursable test costs and scheduling convenience are not justifications for using other organizations. Note that until the airworthiness of a T-2 modification has been recertified, it can only be flown by, or under the oversight of, an AFMC test organization.

3.1.1.4. Source Qualification Statement (SQS). Qualification of supply, repair, and manufacturing sources generally requires an evaluation of their capabilities. Test requirements for these evaluations are placed in the SQS. The pre-ITT reviews all SQSs to ensure T&E requirements are adequate.

3.1.2. ITT. The pre-ITT evolves into the ITT when the lead Government test organization is approved. The ITT expands on the initial TES and develops the operational test criteria. Contractor T&E documents (e.g. tailored requirements, test plans and reports, and system safety plan) are reviewed for completeness. The ITT oversees the test conduct IAW the ITT charter. Representatives from the PM integrated product team (IPT) for the test item and the operational test community will co-chair the ITT. Membership includes the OO-ALC CTA or the approved test organizations. Other experts who should be brought in as required include the product center CTA, the PM for the weapons system, the item manufacturer, range safety, range operations, system operator, and OO-ALC/SE. AFI 99-103 lists additional organizations that may be required depending on the acquisition category. If AFOTEC/AS declines involvement in system-level testing, use other operational representation such as a Force Development Evaluation organization to ensure testing is as operationally realistic as practical.

3.2. Detailed Test Plan. The test organization is responsible for writing the test plan and scheduling the test assets. Generally, test plans should follow the guidelines of the handbooks published by the Test Centers/Wings. These handbooks and examples are available from the Test Representative. For the small scale tests that occur at OO-ALC, the test plan can be tailored significantly, since much of the information requested in the handbooks may not apply. A suggested format for the detailed test plan is in [Attachment 2](#).

3.2.1. Environmental Impact. The test organization must attach an AF IMT 813, **Request for Environmental Impact Analysis**, and forward it with the draft detailed test plan to 75th Civil Engineering Group Environmental Management Division (75 CEG/CEV) for screening and approval of tests conducted at Hill AFB or on the Utah Test and Training Range. A single AF IMT 813 may be used for a class of similar tests. Testing at other locations requires approval by their equivalent Environmental Management function.

4. Technical Review Board (TRB). The CTA has oversight of the TRB process and provides the TRB chairman. The CTA will evaluate all detailed test plans for technical adequacy and technical risk. The CTA may choose to waive the TRB if it determines the test plan is adequate and of low technical risk; all other tests require a TRB. The TRB will ensure a thorough assessment of the test plan for technical soundness and adequacy. It will verify that the overall method of test and test data acquisition is adequate to evaluate the requirements and to verify that the objectives can be met with acceptable technical risk.

4.1. TRB Scheduling. The test organization will schedule and conduct the TRB. The board members must have adequate time to review the test plan prior to the meeting, three working days is a minimum. The CTA will determine the required membership. TRB members should be senior in experience in their appropriate disciplines. The TRB must include members who are technically qualified, with test management experience, and are independent of the program. Mandatory TRB members include representatives from the test organization, CTA, and test item IPT. Other representatives may be required if their area of responsibility is involved. These include OO-ALC/SE, the test range, Explosive Ordnance Disposal (EOD), aircraft maintenance, Airfield Management, Fire Protection, Bioenvironmental Engineering, and Environmental Management. For flight tests, representatives from the weapons system PM and the aircrew are required. If the Test Representative makes a preliminary assessment that a flight test is medium or high safety risk, Test Center/Wing participation is required. Participation may be as a voting board member or through generation of a letter of technical adequacy after review of the completed test plan.

4.2. TRB Documentation. Concerns, action items, and inadequacies in the test plan discovered by the TRB will be documented by the test organization in the TRB minutes. A technical risk assessment will also be documented in the minutes.

4.3. TRB Action Items. The test organization must resolve all action items as determined by the CTA prior to submitting the test for a safety review. TRB minutes along with any corresponding action item responses become part of the test plan.

5. Safety Planning. Safety planning is conducted on all tests to identify risks, reduce those risks as much as possible, and gain acceptance of the residual risk by the proper authority. The test organization is responsible for the safety planning.

5.1. Identify Hazards. The test organization will identify test safety hazards:

- 5.1.1. Contact other personnel with experience in similar testing and system operation.
- 5.1.2. Review the lessons learned databases for hazards identified/lessons learned in other test projects of a similar nature.
- 5.1.3. Review the contractor system safety plans and analyses. These include system/subsystem hazard analysis.
- 5.1.4. Review the contractor and Government previous test results including component qualifications, modeling and simulation, hardware-in-the-loop, and integration.
- 5.1.5. Attempt to identify new hazards that may be unique to the operation of the new item or mission environment.
- 5.1.6. When non-OO-ALC assets/facilities are used, review the safety requirements for those assets/facilities.

5.2. Eliminate/Reduce/Control Test Hazards. The test organization will identify methods to eliminate, reduce, or control the test hazards applying the following safety order of precedence:

- 5.2.1. Design out the test hazard.
- 5.2.2. Reduce risk through change in test design.
- 5.2.3. Incorporate safety devices.
- 5.2.4. Provide caution and warning devices.
- 5.2.5. Develop test procedures and provide proper training of the individuals conducting the test. In cases where predictive data is not available, special emphasis will be placed on adding build-up test points.

5.3. Draft Safety Planning Documents. After completing the above steps in paragraph 5., the test organization will prepare advance copies of the Hill AFB IMT 518, **Test Project Safety Review (Initial and Amendment)**, and Hill AFB IMT 519, **Test Hazard Analysis (THA)**. **Attachment 3** of this instruction contains instructions for completion of these forms. These forms become an appendix to the detailed test plan.

6. Safety Review Board (SRB). OO-ALC/SE has oversight of the SRB process and provides the SRB chairman. The SRB will come after the TRB. The SRB will evaluate the detailed test plan and the draft safety appendix for adequacy of the safety planning. The SRB will ensure hazards have been identified and reduced to minimum reasonable level. Test mishap accountability will be clearly documented. The SRB will evaluate the extent to which the severity and the probability of occurrence of known hazards have been minimized and assess the residual safety risk level using the OO-ALC Subjective Risk Assessment Method (**Attachment 4**).

6.1. SRB Scheduling. The test organization will schedule and conduct the SRB. The board members must have adequate time to review the safety planning documents prior to the SRB, three working days is a minimum. OO-ALC/SE will determine the required membership and the voting board members. SRB members must be technically qualified and not have sufficient project involvement to present a conflict of interest. Absence of a voting member may result in cancellation or delay of the SRB. Mandatory SRB members include representatives from OO-ALC/SE, the test organization, the CTA, the Test Representative, and engineering. Other representatives may be required if their area of

responsibility is involved. These include system safety for the weapons system, aircrew, test range, EOD, Fire Protection, and Bioenvironmental Engineering. If the Test Representative makes a preliminary assessment that a flight test is medium or high safety risk, Test Center/Wing participation is required. Participation may be as a board member or through coordination on the completed test plan.

6.2. SRB Waiver. Based on scope, complexity, similarity to previous tests, and anticipated risk level OO-ALC/SE may choose to waive a formal SRB and just route the test plan through the appropriate experts.

7. Test Plan Coordination.

7.1. Documentation Package. After the SRB, the test organization will include SRB minutes and resolution of action items in Section V of the Hill AFB IMT 518. The test organization will then prepare a complete test documentation package for the coordination process. This documentation package must be arranged in a five-part folder, as shown in [Table 1](#).

Table 1. Documentation.

DOCUMENT	LOCATION
Project title	Outside Front Cover
Detailed Test Plan	Inside Front Cover
Hill AFB IMTs 518 and 519	Tab 1
Run cards, checklists, What-Ifs (if completed)	Tab 2
TRB minutes or waiver letter and AF IMT 813	Tab 3
Supporting documentation	Tabs 4

7.2. Coordination Cycle. After completing the documentation package, the test organization will route the documentation package for required coordination and approval signatures on the Hill AFB IMT 518. When obtaining 388FW signatures, 388FW/SEY may generate a 388FW signature page for routing through the MRTFB Test Approval Authority. In addition to the board members, the following must coordinate on the package by signing the Hill AFB IMT 518: OO-ALC/SE, the PM, and the squadron commander or squadron director of each test organization. Also required is any other organization with Test Mishap Accountability.

7.3. Coordination Comments. Any comments by the coordination officials will be added to the Hill AFB IMT 518. Before adding a comment, the coordination official will notify the test organization so the issue may be resolved, if possible, at the lowest level. The command authority preceding the approval authority will ensure all comments/issues are resolved, if possible, before forwarding the package to the approval authority. The OO-ALC/SE and CTA may require reconvening the TRB and SRB to consider any changes resulting from these comments.

7.4. Test Approval. The approval official for the test plan and attached safety planning documents is dependant on the level of residual risk as determined by the SRB. The approval level for low safety risk tests is the lead test organization squadron commander or director. For low safety risk flight tests this approval level is raised to the lead test organization group commander or director. For all medium safety risk tests the approval authority is the lead test organization wing commander or director. The OO-ALC/CC is the approval authority for all high safety risk tests. Approval authorities may desig-

nate alternates. The SRB may also raise the approval level for tests with high visibility or special interest.

8. Test Execution.

8.1. Test Readiness Review (TRR). The TRB will determine if a TRR is required. The TRR will be scheduled and conducted by the test organization approximately one to seven days before active testing begins. Attendance will include as a minimum representatives of the CTA, PM, test organization, and the test item operator (aircrew for flight test). The test conductor and the test item operator may attend by conference call if off-site scheduling considerations warrant. The TRR will assess all required versus accomplished preparations for the test. Run cards and What-Ifs are usually briefed. Sample TRR checklists and What-Ifs are available from the Test Representative.

8.2. Run Cards. System operators and range controllers conduct the test IAW run cards and checklists. Step-by-step test setups and switch settings are detailed in the run cards. These cards are prepared jointly by the test organization, operators, and controllers. Run cards for flight tests must be approved by the flying organization squadron commander.

8.3. Test Conduct. The test organization will assemble the test assets and schedule the test events. The test organization will conduct a briefing with system operators and controllers prior to each test event. Procedures and limitations will be reviewed. During the conduct of the test, operators and controllers cannot deviate from the run cards unless authorized by the test organization. The test organization is responsible for ensuring test conduct is within the constraints of the detailed test plan and safety documents.

8.3.1. Unexpected Events. Unexpected events may include but are not limited to: damage to the test article or support equipment, exceeding safety-of-test limits, an unfavorable departure from predicted simulation/analysis, or any occurrence judged by a team member to warrant a safety-related pause in the test project. If an unexpected event occurs during the test, the test project will be halted and OO-ALC/SE will be notified to see if a test plan amendment is required.

8.3.2. Changes during test conduct. Deviations from the test plan during the test are not authorized unless the CTA and OO-ALC/SE representatives determine that they are within the scope of the technical and safety planning. Changes exceeding the scope of the original planning require a test plan amendment. Document amendments using an Hill AFB IMT 518 following the instructions in [Attachment 3](#). Unless OO-ALC/SE determines that the risk level is changed, the amendment requires the same coordination and approval as the original test plan.

8.3.3. Extended Testing. Tests extending more than five years since the test plan approval date or with more than 20 amendments must be resubmitted to the CTA and OO-ALC/SE for technical and safety reviews.

9. Test Reporting.

9.1. Type of Report. The test organizations are responsible for reporting test results, deficiencies, and enhancements. Test data must be available to all ITT members. The ITT will determine the type and frequency of reports. A test report can vary in scope from simply providing raw data to a comprehensive Technical Report that includes thorough analysis, conclusions, and recommendations.

9.2. Report Review and Approval. Test reports must be timely, factual, and concise. Reviews by a technical writer and Judge Advocate Directorate (OO-ALC/JA) should be considered for reports con-

tributing to significant program decisions. Test reports will be approved by the test organization squadron commander or director.

9.3. Report Distribution. The ITT will determine the report distribution. Reports are not releasable outside of the Air Force without approval by the PM and contracting officer. Standard Form 298, **Report Documentation Page**, with distribution statement is usually attached to the back of the report front cover. The OO-ALC/EN STINFO officer will assist in distribution statements and archiving reports.

9.4. Report Format. Generally, test reports follow the same format as the test plan with sections added for deficiencies, conclusions, and recommendations. Test Center/Wing report writing guidebooks and examples are available from the Test Representative.

9.5. Special Reporting Requirements. Live Fire testing, operational testing, and programs on the Office of the Secretary of Defense (OSD) oversight list have special reporting requirements found in AFI 99-103.

9.6. Deficiency Reporting (DR). The PM is usually responsible for maintaining the database and acting on submitted DRs IAW TO 00-35D-54, *USAF Material Deficiency Reporting and Investigating System*. The test organizations are normally the originating point for the watch item (WIT) tracking lists and DRs. The ITT is responsible for prioritizing DRs and ensuring that a WIT and DR notification and tracking system is available to all stakeholders during the testing. WITs and DRs that have not been closed out must be mentioned in the final report.

9.7. Lessons Learned. Documenting lessons learned is important to build the knowledge and experience base in the test community. Test participants are encouraged to submit wide applicability lessons learned and best practices to the AFMC/A3F database.

9.8. Project Completion. The test manager must notify OO-ALC/SE and the CTA within 30 days following the final test event. Notification includes listing any safety lessons learned, effectiveness of hazard controls or minimizing procedures, unexpected hazards, value added from the safety review process, and suggestions for improving the safety review process.

10. IMT/Forms.

10.1. IMTs Prescribed. This publication prescribes Hill AFB IMT 518, **Test Project Safety Review (Initial and Amendment)**, and Hill AFB IMT 519, **Test Hazard Analysis (THA)**.

10.2. IMTs Adopted. AF IMT 813, **Request for Environmental Impact Analysis**, and Standard Form 298, **Report Documentation Page**.

KEVIN J. SULLIVAN, Major General, USAF
Commander

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

AFI 99-103, *Capabilities Based Test and Evaluation*
AFMCI 21-126, *Temporary 2 (T-2) Modification of Aerospace Vehicles*
AFMCI 99-103, *Test Management*
AFI 91-202_AFMCI Sup 1, *The USAF Mishap Prevention Program*
AFMAN 37-123, *Management of Records*
FAR, Federal Acquisition Regulations
Hill AFBI 10-401, *Support of Units Deployed to Hill AFB*
RCC Std 321-02, *Common Risk Criteria for National Test Ranges*
T.O. 00-35D-54, *USAF Material Deficiency Reporting and Investigating System*

Abbreviations and Acronyms

388 FW—388th Fighter Wing
388 FW/SEY—388th Fighter Wing, Range Safety Section
75 ABW/JA—75 Air Base Wing Judge Advocate Office
75 CEG/CEV—75th Civil Engineering Group Environmental Management Division
AFI—Air Force Instruction
AFMC—Air Force Materiel Command
AFMC/A3F—AFMC Director of Operations, Fielding and Test Division
AFMCI—Air Force Materiel Command Instruction
AFOTEC—Air Force Operational Test and Evaluation Center
ALC—Air Logistics Center
COI—Critical Operational Issues
COTS—Commercial Off-The-Shelf
CTA—Center Test Authority
DR—Deficiency Report
DoD—Department of Defense
EOD—Explosive Ordnance Disposal
FAR—Federal Acquisition Regulations
HQ—Headquarters

IAW—In Accordance With

IMT—Information Management Tool

IOT&E—Initial Operational Test and Evaluation

IPT—Integrated Product Team

ITT—Integrated Test Team

MAJCOM—Major Command

MDA—Milestone Decision Authority

MEA—Modification Engineering Authority

MOA—Memorandum of Agreement

MRTFB—Major Range and Test Facility Base

NDI—Non-Developmental Item

OO-ALC—Ogden Air Logistics Center

OO-ALC/CC—OO-ALC Commander

OO-ALC/SE—OO-ALC Safety Directorate

OO-ALC/EN STINFO—OO-ALC Engineering Directorate, Science and Technology Information Office

OPR—Office of Primary Responsibility

OSD—Office of the Secretary of Defense

PEO—Program Executive Officer

PM—Program Manager

QT&E—Qualification Test & Evaluation

RDS—Records Disposition Schedule

SQS—Source Qualification Statement

SRB—Safety Review Board

T&E—Test and Evaluation

TES—Test and Evaluation Strategy

TEMP—Test and Evaluation Master Plan

TESTREP—Test Representative

THA—Test Hazard Analysis

TO—Technical Order

TRB—Technical Review Board

TRR—Test Readiness Review

USAF—United States Air Force

USAF/TE—USAF T&E Directorate

WIT—Watch Item Tracking

Terms

Center Test Authority (CTA)—The product or logistics center resident T&E experts, providing advice to center leadership on issues of T&E, and assistance to center PMs.

Component Acceptance Test—Tests performed on every production item or production lot. Acceptance tests are to verify workmanship and materials. Acceptance tests are performed to workmanship levels, no more severe than operational use and of shortened duration. They are usually tailored down from the qualification test requirements. The requirements for acceptance testing are placed in the contract as a condition for Government acceptance of each production item.

Component Qualification Test—Tests to verify any change to the design, process, manufacturer, or repair source. Due to the statistically small sample size of qualification items and uncertainties in the operational environment, qualification tests usually subject the item to levels more severe than the specified operational environment.

Deficiency Report (DR)—The report used to identify, document, and track system deficiency and enhancement data while a system is in advanced development, Test & Evaluation, or operational transition.

First Article Test (FAT)—A special category of component acceptance test performed only on an initial production sample IAW FAR Subpart 9.3.

Flight Test—Any test requiring an aerospace vehicle to move under its own power.

Form, Fit, Function, and Interface (F3I)—F3I is a term applied in specifications to achieve interchangeable parts where complete design freedom is not allowed in that the physically interchangeable parts must function within the defined physical architecture. Form: The term form addresses the physical characteristics of an end item. For hardware items, this would include characteristics such as (1) the product envelope (which could include both internal and external envelopes) (2) weight or mass (3) center of gravity and (4) moments of inertia. The term has less significance for software items, but could include memory storage requirements, throughput requirements, etc. Fit: The term fit is primarily applicable to hardware end items, and addresses the "mating" characteristics with other hardware items and with the user/operator. It would include characteristics such as (1) the location relative to a defined datum of mating surfaces/features (2) the location relative to a defined datum of features designed to facilitate handling, assembly, and installation and (3) mating surface/feature requirements such as flatness or contour. Function: The term function addresses what the end item must be capable of doing for a defined set of conditions. In addition to the obvious performance characteristics, this would include requirements in performance terms for reliability, useful life, maintainability, supportability, and other "-ilities" in general.

Integrated Testing—Any combination of two or more types of testing used to achieve greater test efficiency, reduced cost, and schedule savings without compromising the objectives and needs of the participating test organizations.

Integrated Test Team (ITT)—A cross-functional team of empowered representatives from multiple disciplines and organizations and co-chaired by operational testers and the program manager. The ITT is responsible for developing the T&E strategy and TEMP, assisting the acquisition community with T&E

matters, and guiding the development of integrated test plans.

Oversight—Senior executive-level monitoring and review of programs to ensure compliance with policy and attainment of broad program goals.

Program Manager (PM)—1. The designated individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment to meet the user's operational needs. The PM shall be accountable for credible cost, schedule, and performance reporting to the milestone decision authority (MDA). 2. Applies collectively to system program directors, product group managers, single managers, acquisition program managers, and weapon system managers. Operating as the single manager, the PM has total life cycle system management authority.

Safety Review Board (SRB)—A committee formed to review the test plan and identify any potential safety hazards, possible causes and effects, and develop procedures required to minimize safety risks during testing.

Source Qualification Statement (SQS)—A document which clearly outlines the testing, analysis, inspection, manufacturing, or other quality assurance measure that must be completed by a potential offeror prior to being designated as a qualified source by the design control authority.

Sustainment Commander—The sustainment commander is the program decision authority overseeing the program. This is the logistics center commander or his designated representative for sustainment programs not assigned to a PEO.

Temporary 2 (T-2) Modifications—In accordance with AFMCI 21-126, *Temporary (T-2) Modification of Aerospace Vehicles*, T-2 modifications are configuration changes that support research and development test and evaluation programs and issuance of flight clearances for Initial Operational Test and Evaluation (IOT&E) purposes. The T-2 modifications are temporary hardware or software changes or alterations to aerospace vehicles (aircraft, guided weapons, drones, remotely piloted vehicles, unmanned aerial vehicle, and missiles other than strategic, airborne support equipment, uncertified external and internal stores, subsystems, components, or support equipment that interface with an aerospace vehicle. These temporary changes or alterations may be installed only for the duration of the flight test unless an extension is approved by the delegated Modification Engineering Authority (MEA). The PM has configuration control authority for all weapon systems assigned to them. The PM may delegate engineering and modification approval authority only to an AFMC Test Center/Wing.

Technical Review Board (TRB)—A committee of experienced personnel not directly associated with the test program to provide an independent technical assessment of the test plan.

Test—The act of generating empirical data during the research, development or sustainment of systems, and the creation of information through analysis that is useful to technical personnel and decision makers for reducing design and acquisition risks. The process by which systems are measured against requirements and specifications, and the results analyzed so as to gauge progress and provide feedback. It requires a unique planning effort and procedures outside of or in addition to established T.O.s. The failure of or unexpected results from these procedures may result in a costly loss of the data or create a safety or environmental risk.

Test Approval Authority—The individuals ultimately responsible for accepting the SRB and TRB results and approving the test to proceed with any residual risk.

Test and Evaluation Master Plan (TEMP)—Documents the overall structure and objectives of the T&E program. It provides a framework within which to generate detailed T&E plans and it documents

schedule and resource implications associated with the T&E program. The TEMP identifies the necessary developmental, operational, and live-fire test activities. It relates program schedule, test management strategy and structure, and required resources to the Critical Operational Issues (COI); critical technical parameters; objectives and thresholds documented in the requirements document; and milestone decision points.

Test and Evaluation Strategy (TES)—The overarching integrated T&E plan for the program that describes how operational capability requirements will be tested and evaluated in support of the acquisition strategy. The TES identifies the test organizations and methods of test. The TES is a precursor to the TEMP.

Test Hazard Analysis (THA)—Worksheets included in the safety appendix of the test plan. The THA identifies test hazards, causes, and effects, and establishes risk reduction methods. It is used to determine the residual level of safety risk.

Test Mishap Accountability—The organization that pays for test-related repairs and replacements must be written and approved in the test planning documentation. Testing often requires the preplanned damage/destruction of a unique test asset. Even where damage is not planned, testing involves unknowns that could increase the likelihood of damage/loss. This is part of the cost of conducting the test and in no way implies blame or mishap responsibility.

Test Objectives—A test objective is a statement of a performance or technical parameter to be measured.

Test Plan—A documented approach, resources, and schedule to verify compliance of a system or one of its elements by test.

Test Representative (TESTREP)—A Test Center/Wing advisor and liaison to OO-ALC. Test Representative qualifications are listed in AFMCI 99-103.

Watch Item (WIT)—A problem or suspected problem found during testing that is tracked to collect additional data prior to submitting a DR.

What-Ifs—Pre-briefed and approved test conduct decisions. Using What-Ifs is encouraged to reduce the need for real-time decision making when coordination with all knowledgeable personnel is not practical. These decisions must not exceed the scope and limitations of the test plan and safety documentation.

Attachment 2**DETAILED TEST PLAN, SUGGESTED FORMAT***Detailed Test Plan Title***A2.1. INTRODUCTION.**

A2.1.1. Background. This should be a short paragraph with the following information: identify the test requester, pertinent test history, expected time frame of the test, number of test missions, and general purpose of the test. Include the operational deficiency which the item is intended to remedy, if applicable, the stage in the research and development cycle to which the item has progressed, and any known pending decision based on test results.

A2.1.2. Test Objectives. This section lists each objective individually as a short, concise statement. The test objectives serve as a declaration of what is expected to be achieved. Objectives should be short sentences beginning with an action verb followed by the objective and qualifying phrases. For example: "Evaluate the test item separation characteristics when released at low altitude (10,000 feet)."

Table A2.1. Test Objective Action Verbs.

ACTION VERB	DEFINITION
Collect	To gather test data that require no subsequent analysis, such as bomb fragment data or time-space-position information data.
Compare	To perform a detailed examination of the similarities and differences in test items.
Demonstrate	To show something qualitative or quantitative by doing.
Determine	To discover certain measurable or observable characteristics of a test item.
Evaluate	To establish overall worth (effectiveness, adequacy, usefulness, or capability) of a test item.
Verify	To confirm a suspected, hypothesized, or partly established contention. (This verb should be used sparingly because it implies that a test item has already demonstrated a capability and the test is just confirming that fact.)

A2.1.3. Scope of Test and Test Limitations. Describe the number of test items or flights. Identify modes and parameters not controlled or measured, facility and operational restrictions, etc. that will constrain the testing or limit the applicability of the test results.

A2.2. TEST ITEM DESCRIPTION. This section should include a short paragraph describing each test item in adequate detail to understand all aspects of the test.

A2.3. TEST RESOURCES.

A2.3.1. Test Items. Identify units under test and other assets needed to accomplish the test. Include sources and ownership.

A2.3.2. Facilities and Range Support. Specify test locations. Include key personnel, targets, control room, hot pads, etc.

A2.3.3. Aircraft Operations. List the source of aircraft and aircrew. Include the aircraft configuration, necessary modifications, OFP versions, etc. Also include maintenance and load crew sources and responsibilities.

A2.3.4. Instrumentation. List required instrumentation data. Include locations and sources of data. Reference checkout, calibration, and operation procedures. Instrumentation requirements should include the following:

A2.3.4.1. Instrumentation system resources including telemetry, TSPI, meteorological, and photo documentation requirements.

A2.3.4.2. Data Requirements List. List parameters to be monitored/recorded. Include sample rates, range and accuracy. Define which parameters are go/no-go, both from a technical and safety viewpoint (e.g. The aircraft will not take off or will abort the test condition if a no-go parameter is unavailable.) The measurements and parameters could be categorized as:

A2.3.4.2.1. Category 1. Mandatory for safe conduct of the test (if not available, the test flight will be aborted until repairs are made).

A2.3.4.2.2. Category 2. Required to meet a specific test objective (if not available, those tests will be aborted and others substituted in their place).

A2.3.4.2.3. Category 3. Desirable to accomplish the objective and support data analysis, however other alternate means of assessment can be substituted.

A2.3.4.3. Data Products List. Specify display/reporting format, units, and delivery schedule.

A2.3.5. Test Project Management. List key personnel and include function, organization, and telephone number.

A2.4. METHOD OF TEST. This section describes the actual method to be followed in satisfying each test objective. Detailed procedures are provided for each type of test that will be performed. Describe test conditions; sample sizes; test item operational mode; critical geometry; aircraft configuration; flight profile; switch settings; etc. Fully define any terminology peculiar to this test methodology. List the sequence of test events and any pass-fail results or management decision milestones that must be satisfied before test completion or proceeding to the next test event. For tests with many phases or test events, put a general paragraph here and detailed procedures in an appendix.

A2.5. TEST REPORTING. Specify products the test organization will provide (e.g. transfer of data, data processing and analysis, technical report, recommendation for certification, etc.) Also, specify how deficiencies will be tracked and reported.

A2.6. REFERENCES. Reference earlier testing (plans, tailored Mil Standards, test reports), specifications and other contractual requirements documents, aircraft configuration/modification documentation, and system and facility operational limitations.

Attachment 3**INSTRUCTIONS FOR COMPLETING HILL AFB IMTS 518 AND 519****A3.1. Hill AFB IMT 518: Test Project Safety Review (Initial and Amendment).**

A3.1.1. USE. This form introduces and summarizes the test, documents the research of lessons learned, records the proceedings of the SRB, and provides a vehicle by which the OO-ALC command structure gives final approval for the conduct of the test.

A3.1.2. PREPARATION. The test organization fills out the sections of the form except for Risk Level and Safety Review Synopsis. These will be completed using the results of the SRB. Filled in examples of the Hill AFB IMT 518 and additional instructions are available from the Test Representative.

A3.1.3. AMENDMENTS. This form is also used to document any changes to the test or test item and/or changes to the safety planning and request their approval before continued testing.

A3.2. Hill AFB IMT 519. Test Hazard Analysis (THA).

A3.2.1. USE. This form is a worksheet for developing the Test Hazard Analysis (THA). Each worksheet documents a test unique hazard and the actions the project will take to control the hazard to an acceptable level of risk. The collection of worksheets becomes the THA.

A3.2.2. THA. The THA is an analytical approach to breaking the mishap chain of events between the initial cause and the ultimate effect. Between the Cause and the Effect is the Hazard – the dangerous situation to be avoided through Minimizing Procedures, or remedied through Emergency Procedures.

A3.2.3. A Test Hazard is a hazardous situation that may have an increased likelihood of occurrence due to this test. For example, mid-air collision with non-participating aircraft is usually not considered a test hazard. However, if the very nature of the test may increase the probability of this hazard above that of normal operations, it should be addressed as a test hazard. Pre-existing hazards associated with the weapon system shall be considered.

A3.2.4. Preparation. The test organization is responsible for developing the THA but other test participants may submit additional worksheets. For flight tests, the aircrew must participate. The SRB considers the adequacy of the Minimizing Procedures and Emergency Procedures and assigns a Mishap Severity Category, Mishap Probability, and resulting Risk Level. Filled in examples of the Hill AFB IMT 519 and additional instructions are available from the Test Representative.

Attachment 4

OO-ALC SUBJECTIVE RISK ASSESSMENT METHOD

A4.1. Mishap Probability. This is a subjective evaluation of the probability of the effect occurring. Considerable insight, experience, and engineering judgment are required from the board members.

Table A4.1. Mishap Probability.

PROBABILITY	DESCRIPTION
Frequent	Likely to occur multiple times during this test. Test may exceed design limits or multiple single point failures exist.
Probable	Will likely occur during this test. May be near design limits or single point failure exists.
Occasional	Unlikely to occur during this test, but likely to occur sometime. Some uncertainty and concern about design limits.
Remote	Unlikely to occur during test, but possible to occur sometime. No single point failure.
Improbable	So unlikely, may assume it will not occur.

A4.2. Mishap Severity Category. A qualitative measure of the worst credible mishap.

Table A4.2. Mishap Severity.

CATEGORY	DESCRIPTION
Catastrophic	Death, permanent disability, loss of aircraft or expensive system. Loss exceeding \$1M or irreversible severe environmental damage that violates public law.
Critical	Severe injury, lengthy hospital stay, permanent injury. Severe aircraft, equipment or property damage. Loss between \$200K and \$1M, or reversible environmental damage causing violation of public law.
Marginal	Minor injury with lost work days; medical treatment but no permanent injury. Minor damage between \$10K and \$200K, or mitigable environmental damage without violation of law.
Negligible	Superficial injury, little or no first aid required. Very minor damage, or minimal environmental damage.

A4.3. Risk Level. The degree of residual risk assumed by OO-ALC management. Management approval allows the proposed test to be accomplished in the manner and under the conditions specified. The risk level is determined by entering the mishap category and probability into the risk assessment chart below.

Figure A4.1. Risk Level Assessment

MISHAP SEVERITY	PROBABILITY OF OCCURANCE				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	HIGH		MEDIUM		
Critical					
Marginal				LOW	
Negligible					

Table A4.3. Risk Level Description.

LEVEL	DESCRIPTION
LOW	Tests which present no greater risk than normal operations after appropriate controls have been applied. Routine supervision is appropriate.
MEDIUM	Tests which present a greater risk to personnel, equipment, or property than normal operations even after the appropriate controls have been applied, and require more than routine supervision.
HIGH	Tests which present a significant risk to personnel, equipment, or property, even after all precautionary measures have been taken.

A4.3.1. Quantitative Risk Assessment. If sufficient data are available to form a quantitative assessment of residual risk, this should be used to supplement the subjective method. RCC Std 321-02, Common Risk Criteria for National Test Ranges, sets acceptable mishap probability and severity thresholds.